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NOTICE OF ALLOWANCE AND FEE(S) DUE

24247 7590 04/02/2004

TRASK BRITT
P.O. BOX 2550
SALT LAKE CITY, UT 84110

EXAMINER	
PERT, EVAN T	
ART UNIT	PAPER NUMBER
2829	

DATE MAILED: 04/02/2004

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/736,795	12/14/2000	Michael B. Ball	3817.1US (97-1350.1)	6757

TITLE OF INVENTION: METHOD OF DISPOSING CONDUCTIVE BUMPS ONTO A SEMICONDUCTOR DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$300	$1630	07/02/2004

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:
A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

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Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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nonprovisional	NO	$1330	$300	$1630	07/02/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
PERT, EVAN T	2829	438-613000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent); ❑ individual ❑ corporation or other private group entity ❑ government

4a. The following fee(s) are enclosed:

❑ Issue Fee

❑ Publication Fee

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s):

❑ A check in the amount of the fee(s) is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) (Date)

NOTE; The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

TRANSMIT THIS FORM WITH FEE(S)

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DATE MAILED: 04/02/2004

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004.

Notice of Allowability	Application No.	Applicant(s)	
	09/736,795	BALL ET AL.	
	Examiner	Art Unit	
	Evan Pert	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the amendment filed 12-15-03*.

2. ☒ The allowed claim(s) is/are *1-4,6-9,13-22,24,25 and 28-40*.

3. ☒ The drawings filed on *12 March 2001* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 1200 & 1203
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Cancel claims 10-12 (drawn to a non-elected Species of complete rather than partial removal, without traverse in a paper dated June 10, 2003).

In claim 13 (line 1), change "at least partially" to --partially--.

In claim 14 (line 2), change "at least partially" to --partially--.

In claim 17 (line 1), change "at least partially" to --partially--.

In the title, at the end, delete "and semiconductor devices so formed" (as being directed to a non-elected product, not claimed).

Allowable Subject Matter

2. Claims 1-4, 6-9, 13-22, 24-25 and 28-40 are allowed for reasons of record with "partially" replacing "at least partially" to mean specifically "only partially."

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 703-306-5689. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on 703-308-1233. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ETP
March 21, 2004

EVAN PERT
PRIMARY EXAMINER

10/736795

SD

04/01/04

1. (Currently Amended) A method of disposing a conductive structure on at least one contact pad on an active surface of a semiconductor device substrate, comprising:

disposing a layer comprising polymeric material over the substrate;

imparting said layer with a thickness substantially equal to a desired height of the conductive structure;

forming at least one aperture through said layer to expose at least a portion of the at least one contact pad;

disposing a quantity of conductive material on said layer and permitting said conductive material to substantially fill said at least one aperture;

bonding said conductive material within said aperture to the at least one contact pad to form the conductive structure of substantially said desired height; and

~~at least~~ partially exposing a lateral periphery of the conductive structure through said layer.

2. (previously presented) The method of claim 1, wherein said disposing said quantity of conductive material on said layer comprises disposing a quantity of substantially molten conductive material on said layer.

3. (original) The method of claim 2, wherein said bonding is effected as said quantity of substantially molten conductive material solidifies in said at least one aperture.

4. (original) The method of claim 1, wherein said disposing said layer comprises adhering a film to a surface of the substrate.

5. (canceled)

6. (previously presented) The method of claim 1, wherein said disposing said layer comprises placing a quantity of polymeric material on the substrate and wherein said imparting comprises spreading said polymeric material to a substantially consistent thickness over at least a portion of a surface of the substrate.

7. (original) The method of claim 1, wherein said forming said aperture occurs prior to said disposing said layer over the substrate.

8. (original) The method of claim 1, wherein said forming said aperture comprises etching said aperture through said layer.

9. (original) The method of claim 8, wherein said etching occurs following said disposing said layer over the substrate.

Claims 10 through 12 (canceled)

13. (previously presented) The method of claim 1, wherein said at least partially exposing said lateral periphery of the conductive structure comprises reducing said thickness of said layer.

14. (original) The method of claim 13, wherein said reducing said thickness comprises at least partially etching said layer.

15. (original) The method of claim 13, wherein said reducing said thickness comprises shrinking said layer.

16. (previously presented) The method of claim 15, wherein said shrinking comprises exposing said layer to radiation, exposing said layer to a shrinking agent, or exposing said layer to a plasma.

17. (previously presented) The method of claim 1, wherein said at least partially exposing said lateral periphery comprises exposing said layer to a solvent.

18. (original) The method of claim 1, wherein said disposing said quantity of conductive material comprises immersing a surface of the substrate having said layer disposed thereon within a quantity of molten conductive material.

19. (original) The method of claim 1, wherein said disposing said quantity of conductive material comprises disposing solder on said layer.

20. (original) The method of claim 1, wherein said disposing said quantity of conductive material comprises disposing conductive elastomer on said layer.

21. (previously presented) The method of claim 1, wherein said forming said aperture comprises exposing a portion of said at least one contact pad located within a periphery thereof.

22. (Currently Amended) A method of forming a solder mask, comprising:
disposing a solder mask material comprising a polymer onto an active surface of a substrate;
forming a layer of said solder mask material having a substantially consistent thickness on the active surface of said substrate, said thickness of said layer being substantially equal to a desired conductive structure height; and
forming at least one aperture through said layer in a location corresponding to a location of at least one contact pad of said substrate to expose said at least one contact pad through said solder mask, said solder mask material facilitating a partial reduction in said thickness when the conductive structure has been at least partially formed in said at least one aperture.

23. (canceled)

24. (previously presented) The method of claim 22, wherein said disposing and said forming said layer are effected substantially simultaneously.

25. (previously presented) The method of claim 22, wherein said forming said layer comprises planarizing said layer.

26-27. (canceled)

28. (previously presented) The method of claim 22, wherein said forming said layer comprises softening or melting said solder mask material.

29. (previously presented) The method of claim 28, wherein said forming said layer comprises spinning said solder mask material over said active surface.

30. (previously presented) The method of claim 28, wherein said forming said layer comprises spreading said solder mask material across said active surface.

31. (previously presented) The method of claim 22, wherein said forming said at least one aperture comprises etching a region of said layer.

32. (previously presented) The method of claim 22, wherein said at least one solder mask material comprises a photosensitive polymeric material and wherein said forming said at least one aperture comprises exposing a region of said photosensitive polymeric material disposed over said at least one contact pad to form said at least one aperture through said layer.

33. (Currently Amended) A method of exposing at least a portion of a lateral periphery of a conductive structure on a semiconductor device, comprising partially reducing a thickness of a solder mask that comprises polymeric material disposed around said lateral periphery.

34. (original) The method of claim 33, wherein said reducing said thickness comprises irradiating said solder mask, exposing said solder mask to a plasma, or exposing said solder mask to a shrinking agent.

35. (original) The method of claim 33, wherein said reducing said thickness comprises selectively etching a material of said solder mask with respect to the conductive structure.

36. (currently amended) A method of exposing a conductive structure that protrudes from a surface of a semiconductor device through a solder mask that comprises a polymeric material positioned on the surface of the semiconductor device, comprising:
partially reducing a thickness of at least portions of the solder mask laterally surrounding the conductive structures.

37. (previously presented) The method of claim 36, wherein said reducing comprises reducing a thickness of substantially all of the solder mask.

38. (previously presented) The method of claim 36, wherein said reducing comprises exposing the solder mask to at least one of radiation, a plasma, and a shrinking agent.

39. (previously presented) The method of claim 36, wherein said reducing comprises removing a material of the solder mask with selectivity over a material of the conductive structures.

40. (previously presented) The method of claim 39, wherein said removing comprises etching the material of the solder mask with selectivity over the material of the conductive structures.